Precalc Warm Up # 3-3

1. Expand: $(2x + 3)^5$

2. Factor:

a. $25 - (z + 5)^2$ b. $12x^2 + 7x + 1$ c. $27x^3 + 8x^6$

d. $2x^3 - x^2 - 6x + 3$ e. $x^{16} - 1$

HW Questions? p. 26

13. $\dfrac{12(x + y)^3}{9(x + y)}$

15. $(-2x^2)^3(4x^3)^{-1}$

19. $(4a^{-2}b^3)^{-3}$

In Exercises 23 and 24, write each number in scientific notation.

23. (a) 93,000,000

41. (a) $64^{-2/3}$

$\left(\frac{1}{64}\right)^{2/3}$

$\left(\frac{1}{\sqrt[3]{64}}\right)^2$

$\left(\frac{1}{4}\right)^2 \rightarrow \boxed{\frac{1}{16}}$

45. (a) $\sqrt{75x^2y^{-4}}$

$\sqrt{25 \cdot 3 x^2 \left(\frac{1}{y^2}\right)^2}$

$5|x| \cdot \frac{1}{y^2}\sqrt{3}$

$= \frac{5|x|\sqrt{3}}{y^2}$

In Exercises 47–50, use fractional exponents to verify the indicated reduction of the index.

49. $\sqrt[6]{(x+1)^4} = \sqrt[3]{(x+1)^2}$

$(x+1)^{4/6} = (x+1)^{2/3}$

$(x+1)^{2/3} = (x+1)^{2/3}$

53. (a) $\frac{5}{\sqrt[3]{(5x)^2}} \cdot \frac{\sqrt[3]{5x}}{\sqrt[3]{5x}} = \frac{5\sqrt[3]{5x}}{\sqrt[3]{(5x)^3}}$

$a^2 \cdot a^1$

a^3

$\frac{5\sqrt[3]{5x}}{5x}$

rationalize denominator:

55. (a) $\frac{3}{(\sqrt{5}+\sqrt{6})} \frac{\sqrt{5}-\sqrt{6}}{(\sqrt{5}-\sqrt{6})}$

$\frac{3(\sqrt{5}-\sqrt{6})}{5-6}$

$-3(\sqrt{5}-\sqrt{6})$

rationalize numerator:

59. (a) $\frac{(\sqrt{3}-\sqrt{2})}{x} \frac{(\sqrt{3}+\sqrt{2})}{(\sqrt{3}+\sqrt{2})}$

$\frac{3-2}{x(\sqrt{3}+\sqrt{2})}$ . . .

63. (a) $2\sqrt{4y} - 2\sqrt{9y} + 10\sqrt{y}$

$4\sqrt{y} - 6\sqrt{y} + 10\sqrt{y}$

$8\sqrt{y}$

65. (a) $\sqrt{5x^2y}\sqrt{3y}$ $= \sqrt{15x^2y^2} = |xy|\sqrt{15}$

67. $\sqrt{50}\sqrt[3]{2}$

$\sqrt{25 \cdot 2}$

$5\sqrt{2}\ \sqrt[3]{2}$

$5 \cdot 2^{1/2} \cdot 2^{1/3}$

$5 \cdot 2^{5/6}$

$5\sqrt[6]{2^5}$

71. (a) $2400(1 + 0.06)^{20}$

$\frac{3}{3} \cdot \frac{1}{2} + \frac{1}{3} \cdot \frac{2}{2}$

$\frac{3}{6} + \frac{2}{6}$

HW Questions? p. 39

21. $(x + \sqrt{5})(x - \sqrt{5})(x + 4)$

25.

$(a+b)^2$

$a^2 + 2ab + b^2$

31. $(m - 3 + n)(m - 3 - n)$

$m^2 - 3m - mn + 9 + 3n - n^2$

$-3m + mn - 3n$

$m^2 - 6m + 9 - n^2$

27. $[(x-3) + y]^2$

$(x-3)^2 + 2(x-3)y + y^2$

$x^2 - 6x + 9 + 2xy - 6y + y^2$

35. $(2x - y)^3$

$1(2x)^3 + 3(2x)^2(-y) + 3(2x)(-y)^2 + 1(-y)^3$

$8x^3 - 12x^2y + 6xy^2 - y^3$

39. $(x-1)^2 + 6(x-1)$

factor out $(x-1)$

$(x-1)(x-1+6)$

$(x-1)(x+5)$

In Exercises 41–44, factor squares.

41. $16y^2 - 9$

43. $(x - 1)^2 - 4$

45. $x^2 - 4x + 4$

53. $9z^2 - 3z - 2$

55. $x^3 - 8$

59. $x^3 - x^2 + 2x - 2$

63. $6 + 2x - 3x^3 - x^4$

65. $x^3 - 4x^2$

69. $9x^2 + 10x + 1$

73. $2(x + 1)(x - 3)^2 - 3(x + 1)^2(x - 3)$

73) 2 terms. Factor out what they have in common:

$(x+1)(x-3)(2(x-3)-3(x+1))$

distribute and combine like terms

$(x+1)(x-3)(-x-9)$

$-(x+1)(x-3)(x+9)$

79. $2t^3 - 16$

$2(t^3 - 2^3)$

$2(\quad)$

today: PC book: 1.4

Add, subtract, multiply and divide rational expressions.

Simplify complex fraction expressions.

Using factoring to reduce fractions to lowest terms.

$$\frac{15}{5} = \frac{10+5}{5} \neq 10$$ ☹

$$\frac{15}{5} = \frac{3 \cdot 5}{5} = 3$$ ☺

If you want to reduce by CANCELING,
you must FACTOR first and cancel out entire factors.

$$\frac{x^3 - 4x}{x^2 - 4x + 4}$$

$$\frac{x(x+2)(x-2)}{(x-2)(x-2)}$$

$$\frac{12 + x - x^2}{2x^2 - 9x + 4}$$

first factor -1 out to make it easier

$$\frac{-(x^2 - x - 12)}{(2x-1)(x-4)}$$

$$\frac{-(x+3)(x-4)}{(2x-1)(x-4)}$$

$$\frac{4-x}{x-4} \rightarrow \frac{-1(-4+x)}{(x-4)}$$

Multiplying and Dividing Rational Expressions:

$$\frac{x^3-8}{2x^3}\cdot\frac{4x}{x^2-5x+6}$$

$$=\frac{(x-2)(x^2+2x+4)(4x)}{(x-3)(x-2)(2x^3)}$$

$$=\frac{2(x^2+2x+4)}{x^2(x-3)}$$

$$\frac{\frac{x^2-y^2}{xy}}{\frac{(x-y)^2}{xy}}$$

$$=\frac{(x+y)(x-y)}{xy}\cdot\frac{xy}{(x-y)(x-y)}$$

$$=\frac{x+y}{x-y}$$

Adding and Subtracting Rational Expressions.
(You need a common denominator.)

$$\frac{3}{x-1}-\frac{2}{x}+\frac{x+3}{x^2-1}$$

LCD $=x(x+1)(x-1)$

$$\frac{x(x+1)}{x(x+1)}\cdot\frac{3}{x-1}-\frac{2}{x}\cdot\frac{(x^2-1)}{(x^2-1)}+\frac{x+3}{x^2-1}\cdot\frac{x}{x}$$

$$\frac{3x^2+3x-2x^2+2+x^2+3x}{x(x+1)(x-1)}$$

$$\frac{2x^2+6x+2}{x(x+1)(x-1)}$$

$$\frac{2(x^2+3x+1)}{x(x+1)(x+1)}$$

Simplify the compound fraction

$$\frac{\frac{2}{x}-\frac{3x}{x}}{1-\frac{1}{x-1}} = \frac{\frac{2-3x}{x}}{\frac{x-2}{x-1}}$$

Now flip the denom. and multiply.

$$= \frac{2-3x}{x}\cdot\frac{x-1}{x-2} \rightarrow \boxed{\frac{(2-3x)(x-1)}{x(x-2)}}$$

Do it again using the LCD method: LCD = $x(x-1)$

$$\frac{\frac{2}{x}-3}{1-\frac{1}{x-1}}\cdot\frac{LCD}{LCD} = \frac{\left(\frac{2}{x}-3\right)}{\left(1-\frac{1}{x-1}\right)}\cdot\frac{x(x-1)}{x(x-1)}$$

$$= \frac{\frac{2}{x}\cdot x(x-1) - 3x(x-1)}{1x(x-1) - \frac{1}{x-1}\cdot x(x-1)}$$

$$= \frac{2(x-1)-3x(x-1)}{x(x-1)-x}$$

* Factor $(x-1)$ out of num. & x out of den

$$= \frac{(x-1)(2-3x)}{x(x-2)}$$

Simplifying an expression that has negative exponents.

$$x(1-2x)^{-3/2} + (1-2x)^{-1/2}$$

$$\frac{x}{(1-2x)^{3/2}} + \frac{1}{(1-2x)^{1/2}}\cdot\frac{(1-2x)^1}{(1-2x)^{3/2}}$$

$$\frac{x+1-2x}{(1-2x)^{3/2}}$$

$$\frac{1-x}{(1-2x)^{3/2}}$$

$$a^m \cdot a^n$$

$$a^{m+n}$$

Rationalizing the denominator or the numerator

1. Rationalize the denominator

$$\frac{4}{\sqrt{x+2}} \cdot \frac{\sqrt{x+2}}{\sqrt{x+2}} \qquad \frac{4\sqrt{x+2}}{x+2}$$

2. Rationalize the numerator

$$\frac{\sqrt{z-3}-\sqrt{z}}{3} \cdot \frac{\sqrt{z-3}+\sqrt{z}}{\sqrt{z-3}+\sqrt{z}}$$

$$\frac{z-3-z}{3(\sqrt{z-3}+\sqrt{z})}$$

$$\frac{-3}{3(\sqrt{z-3}+\sqrt{z})}$$

$$\frac{-1}{\sqrt{z-3}+\sqrt{z}}$$

HW: PC book

p. 49 #3 - 59☐

p. 84 #3 - 21☐, 26, 31, 35, 37, 39, 42

Unit test: Friday

Covers: PC book Chapter 1
SL book Chapter 2